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Mechthild Schrooten and
Sabine Stephan

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EU-Accession Countries:
Evidence From a Dynamic Panel Data
Model

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DIW Berlin

German Institute
for Economic Research

Königin-Luise-Str. 5
14195 Berlin,
Germany

Phone +49-30-897 89-0

Fax +49-30-897 89-200

www.diw.de

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by

Mechthild Schrooten and Sabine Stephan **

Mechthild Schrooten

DIW Berlin
German Institute for Economic Research
Koenigin-Luise-Str. 5
14195 Berlin
tel. +49-30-89789-344
fax +49-89789-108
mschrooten@diw.de

Sabine Stephan

DIW Berlin
German Institute for Economic Research
Koenigin-Luise-Str. 5
14195 Berlin
tel. +49-30-89789-417
fax +49-3089789-102
sstephan@diw.de

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** Corresponding author: Sabine Stephan, German Institute for Economic Research (DIW Berlin), Koenigin-Luise-Str. 5, D-14195 Berlin, Germany. email: sstephan@diw.de

Suggested abbreviation of the title: Private savings

Private Savings in Eastern European EU-Accession Countries: Evidence From a Dynamic Panel Data Model

Abstract:

After the collapse in early transition years, saving rates in Eastern European EU-accession countries have recovered strongly. Is private saving in these countries now driven by the same forces as in the EU? A GMM estimator is applied to analyze the determinants of private saving in both country groups. Main results are: saving rates are persistent; income growth increases saving, whereas public saving crowds out private saving. Domestic saving and foreign capital operate as substitutes. Long-run effects of income growth and public saving are larger in the EU than in the candidate countries, indicating that saving behavior in the EU is determined to a larger extent by long-run perspectives than in the candidate countries.

Keywords: Dynamic panel data model, private savings, Eastern European EU-accession countries, GMM estimator

JEL-classification: C33, E21

1. Motivation

The enlargement of the EU is an enormous challenge – both for the accession countries and for the European Union itself. The fact that the great majority of the EU candidate countries are still in their infancy as market economies, having gone through a rapid transition from socialism in the space of just a few years, may still lead to difficult and unforeseeable situations. As negotiations between the European Union and its Eastern European neighbouring countries stand, ten transformation economies are currently being considered for accession: the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic and Slovenia are set to join in May 2004, and Romania and Bulgaria will join in 2007. Most of these countries have already achieved substantial economic growth rates. This is particularly remarkable in view of the fact that these countries required enormous capital investments in order to catch up since their capital stocks were almost completely devaluated during transformation.

Investment can be financed either by domestic savings or by foreign capital. If capital were perfectly mobile, then changes in domestic investment would be independent of changes in domestic savings (Feldstein/Horioka 1980). In practice, however, foreign capital flows can serve only to a limited extent as substitutes for domestic savings (Rodrik 2000). Against this background, knowing how to promote domestic savings with a set of suitable policy instruments is essential, particularly in the case of developing economies. By definition, domestic savings consists of private and public sector savings. Since private savings usually makes up the lion's share of domestic savings, discovering the determinants of private savings is a key task for both economists and policy makers.

The central hypothesis of our paper is that the determinants of private savings in the EU-accession countries of Eastern Europe are very similar to those in EU member states themselves, despite the two regions' very different economic histories. In this study, we estimate a variety of different equations for the private savings rate in both the Eastern European EU candidate countries and the EU in order to assess the effects of policy-related and non-policy-related determinants of saving upon the private savings rate. In doing so, we single out those determinants generally regarded as important in the existing literature on this topic. Although these equations are grounded in the theory of private consumption (and saving), we do not impose a narrow structural model but prefer a reduced-form approach; that is, we allow for a broad range of savings determinants, and, consequently, for a variety of theoretical views about saving. Because of the breadth it offers, this approach has proven useful in tackling our main issue – the identification of the key determinants of private savings.

Although much has been written on the topic of savings, this paper is -- to our knowledge -- the first comprehensive study on private saving in the Eastern European EU-accession countries to use the EU saving determinants as a benchmark. Previous empirical studies have either focused on saving in market economies (Edwards 1995; Loayza/Lopez/Schmidt-Hebbel/Servén 1998; Bailliu/Reisen 1998; Loayza/Schmidt-Hebbel/Servén 1999 and 2000), or have dealt specifically with the determinants of savings in the Central and Eastern European transition economies and successor states to the Soviet Union (Denizer/Wolf 1998 and 2000). The latter studies, however, face a specific problem, because economic recovery – and hence the rebound in savings rates – in many of the transition countries of South-eastern Europe and the CIS¹ was delayed by tremendous exogenous shocks, and in some cases even civil wars. This means that the

economic crisis that has always accompanied the beginning of transition lasted significantly longer in these countries than in the candidate countries for EU membership.

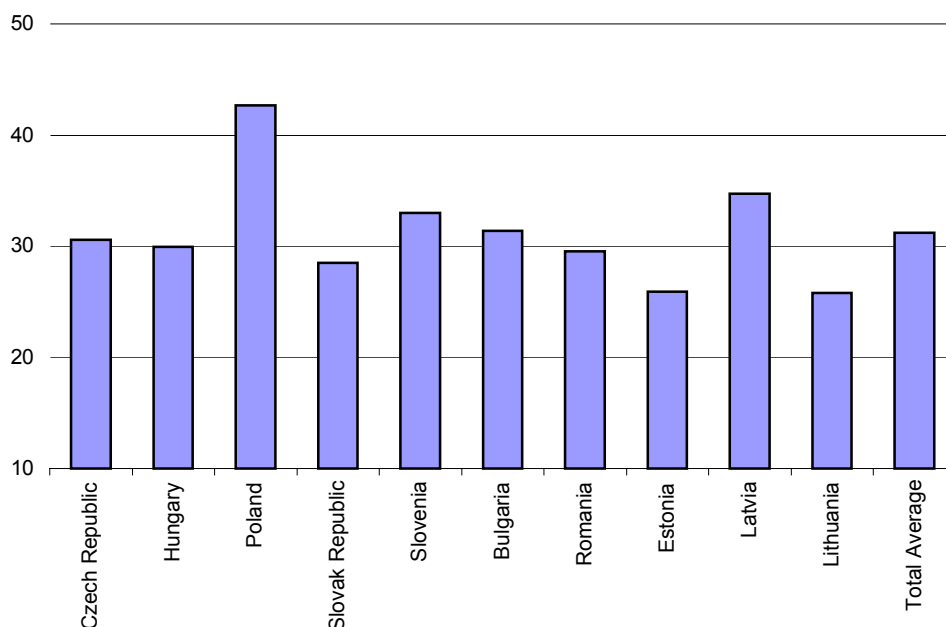
This paper thus seeks to fill at least three analytical gaps: First, since we address the question of whether private saving in EU-accession countries is driven by the same motives as it is in the EU, we investigate the saving determinants for both groups of countries using corresponding panel data sets. Second, we apply an estimation approach which explicitly takes into account two major problems that always arise when savings determinants are empirically investigated: first, since one can expect that savings rates change rather sluggishly due to underlying stable consumption habits, a dynamic specification is required. Second, the majority of explanatory variables might be determined jointly with the savings rate. In this study, we tackle both issues by estimating dynamic panel data models using appropriate Generalized Method of Moments (GMM) estimators. Third, the dynamic model specification enables us to find out how the determinants selected here as the most important affect the private savings rate in the Eastern European candidate countries and in the EU, in both the short and long term.

The paper is organised as follows: in Section 2, we sketch out the main characteristics of saving in the Eastern European accession countries during the pre-transition period, and contrasted against this, we discuss the savings developments that followed transition. In Section 3, the data is presented, and in Section 4, we describe the estimation approach and explain how we proceed with the model specification. Our empirical findings are presented in Section 5, and Section 6 summarises our conclusions.

2. Savings in Eastern Europe before and after Transition

Savings rates were exceptionally high in Central and Eastern European countries during the socialist era. In the eighties, average domestic savings rates of around 35 percent were reported for these countries, while in the industrialised world, domestic savings rates reached only about 20 percent of gross domestic product. And in contrast to “Western” saving, which tended to decline in the eighties, socialist savings rates exhibited an upward trend. However, savings rates within the socialist bloc differed significantly (Figure 1). While Poland was on top with a domestic savings rate of about 43 % in 1989, savings rates in Estonia and Lithuania only reached about 26 %.

Figure 1: Pre-transition domestic savings rates (1989)



Source: National Statistics, World Development Indicators, authors' own calculations.

It is assumed that saving during the socialist era was driven by three main factors: first, there was “planned” saving, which was necessary for funding “centrally planned” investment. Second, voluntary private saving took place, in particular to finance durable consumer goods. Third, the lack of consumer goods motivated what was called “involuntary” or “forced” saving (Denizer/Wolf 2000 and 1998). Consequently, the amount of private savings clearly exceeded the amount of voluntary savings during this time. However, data on the extent of private saving during the socialist era are not available.

With the beginning of the transformation process², domestic savings rates declined significantly in all the countries under consideration (Figure 2). At first glance, the drop in savings rates following the start of the transformation process can be interpreted as a reaction to the consumption constraint and savings overhang inherited from the past. However, other factors resulting from transformation should also be taken into account: inflation rates reached very high levels, GDP dropped, unemployment rose and the outcome of the transformation process as a whole seemed completely unclear. Additionally, confidence in the domestic currency as well as in the banking sector may have been extremely low due to the fact that inflation was high and volatile and bank solvency appeared precarious. All in all, the great uncertainty at the beginning of the transformation process may have induced very short planning horizons. Under these conditions, it is remarkable that domestic savings rates in the Eastern European EU-accession countries were not negative in the initial years of transformation (Table 1).

Table 1: Gross domestic savings as a percentage of GDP

| | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Czech Republic | 30.6 | 27.8 | 30.1 | 27.2 | 28.2 | 27.1 | 29.3 | 27.8 | 26.6 | 28.7 | 26.4 | 26.0 |
| Hungary | 29.9 | 28.0 | 19.5 | 15.8 | 11.8 | 15.7 | 22.7 | 26.1 | 27.7 | 27.6 | 26.0 | 26.5 |
| Poland | 42.3 | 32.8 | 18.0 | 16.7 | 16.5 | 19.9 | 22.1 | 20.3 | 20.2 | 21.0 | 20.0 | 19.6 |
| Slovak Republic | 28.5 | 24.2 | 28.2 | 24.1 | 21.3 | 27.2 | 29.1 | 27.0 | 26.8 | 25.2 | 26.5 | 27.6 |
| Slovenia | 33.0 | 32.0 | 26.4 | 24.7 | 20.4 | 23.2 | 21.3 | 22.5 | 23.4 | 24.0 | 24.0 | 24.2 |
| Average¹ | 35.6 | 30.0 | 22.2 | 19.8 | 18.6 | 21.3 | 24.0 | 23.4 | 23.4 | 24.0 | 22.9 | 22.8 |
| Bulgaria | 31.4 | 22.0 | 26.9 | 14.1 | 7.7 | 8.8 | 14.1 | 11.5 | 16.9 | 13.9 | 11.3 | 11.0 |
| Romania | 29.5 | 20.8 | 24.1 | 23.0 | 24.0 | 22.7 | 18.7 | 17.4 | 13.6 | 9.8 | 12.8 | 13.6 |
| Average¹ | 30.0 | 21.1 | 24.9 | 20.4 | 19.4 | 18.9 | 17.4 | 16.0 | 14.4 | 10.9 | 12.4 | 12.9 |
| Estonia | 25.9 | 22.3 | 34.5 | 32.7 | 22.6 | 16.7 | 18.7 | 16.3 | 19.3 | 19.0 | 18.8 | 21.0 |
| Latvia | 38.0 | 38.8 | 43.5 | 48.1 | 25.0 | 20.8 | 15.2 | 10.7 | 14.3 | 14.1 | 16.7 | 18.6 |
| Lithuania | 25.8 | 24.0 | 32.9 | 19.2 | 11.4 | 12.4 | 12.9 | 14.7 | 16.0 | 12.5 | 12.3 | 14.3 |
| Average¹ | 30.2 | 28.8 | 36.9 | 31.5 | 18.6 | 16.3 | 15.3 | 14.0 | 16.5 | 14.9 | 15.7 | 17.7 |
| Total Average¹ | 34.3 | 28.5 | 23.8 | 20.7 | 18.7 | 20.7 | 22.6 | 21.9 | 21.9 | 21.9 | 21.3 | 21.3 |

¹ GDP weighted

Source: National Statistics, World Development Indicators, authors' own calculations.

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Figure 2: Gross domestic savings rates

Figure 2a

As a percentage of GDP

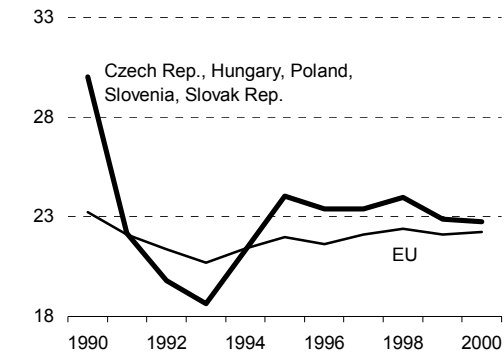


Figure 2b

As a percentage of GDP

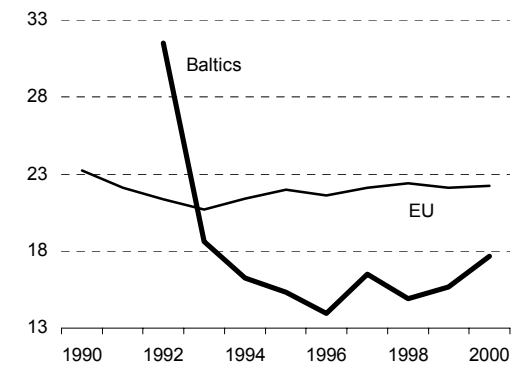
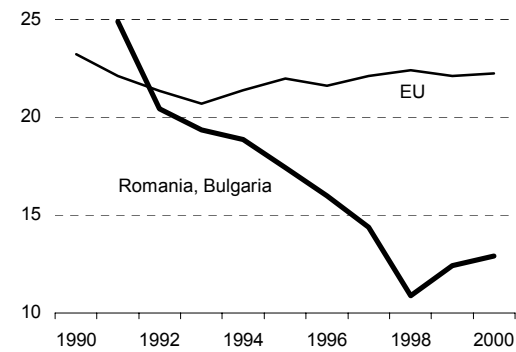


Figure 2c

As a percentage of GDP



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The initial transition shock hit all former socialist countries equally. Many members of the CIS, however, suffered additionally from various policy-induced shocks which led to far-reaching and long-lasting economic crises in these countries. With regard to savings, the CIS countries have demonstrated a wide range of behavior: some, like Armenia and Georgia, reported two-digit negative savings rates for many years, while official saving rates in the Russian Federation remained above 20 percent despite the country's severe economic depression. However, one has to keep in mind that for most of the CIS countries, the database is still comparably weak. The erratic jumps one finds in the figures for domestic savings indicate that these figures may be only marginally reliable.

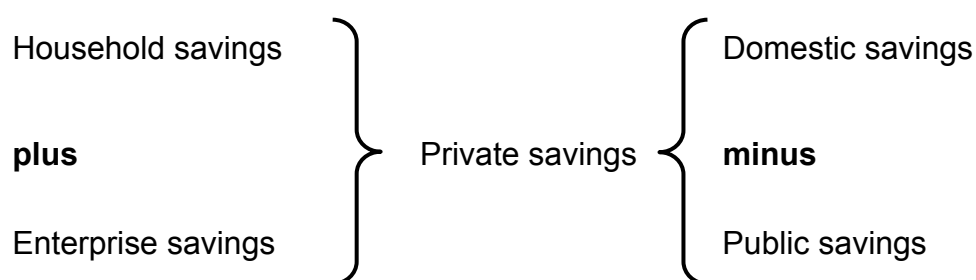
In contrast to the CIS countries, the majority of the Eastern European EU-accession countries (Czech Republic, Hungary, Poland, Slovenia, Slovak Republic, Baltic countries) managed transformation quite successfully. As a result of the economic rebound, domestic saving rates recovered as well, following a characteristic pattern: after the massive slump in the initial year of transition, savings rates declined further in the following two to three years, but with significantly lower rates (see Figure 2a and 2b). Then they turned upward again and stabilised in subsequent years. However, there are remarkable differences with regard to the level of domestic savings rates: in the Czech Republic, Hungary, Poland, the Slovak Republic and Slovenia, they clearly exceed the EU member states' average, whereas in the Baltic countries they only reach about 80% of the average EU rates. In contrast to this, domestic savings rates in Romania and Bulgaria have dropped steadily since the beginning of the transformation process (Figure 2c). This is mainly due to the fact that both countries experienced another economic crisis in the second half of the nineties and significantly lower economic growth rates than the other countries during

the years in between. The rebound in savings rates in these countries has been a relatively recent occurrence.

3. Data

Studies that analyse the determinants of private saving empirically always face the same problem: official figures for private savings are nearly impossible to come by. However, these figures can be calculated using the fact that private savings, by definition, equal the sum of household and enterprise savings as well as the difference between domestic and public savings (Figure 3).

Figure 3: Definition of private savings



For the Eastern European EU candidate countries, however, figures for household and enterprise savings are unavailable. Consequently, we have to calculate private savings as the difference between gross domestic savings and public sector savings. But again, we meet with an obstacle: whereas official data is available for domestic savings, this is typically not the case for public sector savings. Thus, one has to make reasonable assumptions when choosing a proxy for public sector savings. In general, it is reasonable to use the broadest definition of the public sector available. For the Eastern European EU-accession countries, this would be the definition of the

central government, which includes both the consolidated central government and the state-owned enterprises. Hence, we use the overall budget balance³ of the central government as a proxy for public sector (dis-)savings. While this approach can be questioned because of its use of simplified assumptions, it remains the one most commonly utilised if the data situation is comparatively poor (see Loayza/Schmidt-Hebbel/Servén 2000) and offers the advantage of allowing us to compare our findings with previous studies.

In the following, we estimate various specifications for *private savings rates* in Eastern European EU candidate countries as well as in the EU itself. Our goal is to identify and describe the key determinants thereof. Due to data restrictions in the case of the EU-accession countries, we follow Denizer and Wolf (1998) and use the ratio of private savings to gross domestic product (GDP).⁴ As regards the EU member countries, however, we use two different time series for the private savings rates. One is calculated in exactly the same way as the private savings rate for the EU candidate countries. The other is provided by the World Bank in the 'World saving database': again, private savings are calculated as the difference between gross domestic savings and public sector savings, but the concept for the public sector is now the general government, defined as the consolidated central government plus state, local and regional governments. Furthermore, public sector savings are adjusted for net capital transfers. The private savings rate is the ratio of private savings to gross national disposable income. A comparison of the estimated models for these alternative versions of the private savings rate will show whether the way of calculating the private savings rate affects the estimation results. Against this background, we can conclude whether the simple approach for the calculation of the private savings rate which has to be accepted for the EU-accession countries due to data restrictions, has any negative effects on the reliability of the estimation results.

The set of potential key determinants comprise the following explanatory variables:

Persistence in savings behaviour

- private savings ratio of the previous period to account for persistence in savings patterns due to underlying stable consumption habits

Income variables

- annual growth rate of real per capita GDP measured in constant 1995 US-dollars as a proxy for growth of per capita income
- log of smoothed real per capita GDP measured in constant 1995 US-dollars as a proxy for the development of the income level. Smoothed income is calculated by averaging per capita GDP of the previous, the current and the subsequent period. This variable takes into account that individuals make consumption decisions with respect not only to current income, but also to permanent income

Uncertainty

- inflation measured as the annual growth rate of the consumer price index as well as the unemployment rate interpreted as a proxy for general macroeconomic uncertainty and individual income uncertainty respectively. While commonly used in empirical studies the level of these variables does not reflect uncertainty but rather their volatility. Therefore, two different inflation measures are additionally tried: the deviation from the average inflation rate during transformation for every country and its squared value

Financial market performance

- real interest rate calculated as nominal lending rate minus a smoothed inflation rate⁵ in order to take expectation-building into account

- credit provision to the private sector as a percentage of GDP to determine access of the private and the enterprise sector to domestic credit
- M2/nominal GDP as a proxy for financial depth and, thus, for the performance of the domestic financial market

Demographics

- dependency ratio, defined as people aged 0-14 and 65 and over to the working-age population, to account for unequal income flows over the life-cycle

International financial integration

- current account deficit as a percentage of GDP as a proxy for international borrowing and therefore for international financial integration. While commonly used in empirical studies, this variable poses a problem, since it is jointly determined with saving in countries that have access to international financial markets. Otherwise, it is exogenously determined (see Loayza, Schmidt-Hebbel, Servén 1999). We cope with this problem by treating the current account deficit as a strictly endogenous variable in the estimation procedure
- Foreign direct investment as a percentage of gross fixed capital formation as an indicator for the ability of a country to attract foreign capital

Institutional development

- an extended version of the transition indicator provided by the European Bank for Reconstruction and Development (EBRD). This serves as a proxy for the progress made through the process of transition. Since the indicator is constructed as the average of “transformation” in the areas of enterprise restructuring, competition policy, as well as bank and security sector reform, we use it to account for the progress already achieved in institutional development⁶

Fiscal policy

- public saving ratio in order to check whether Ricardian effects on private saving can be detected

Initial condition

- dummy variable that controls for the initial ‘shock’ (including data mis-measurement) that may have occurred in the first year of transition.

The country set includes Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic and Slovenia ($N=10$). The regressions are based on annual data taken from the World Bank “World Development Indicators“, the EBRD Transition Report, IMF International Financial Statistics and from national statistics (see Appendix, Table 1 for details). The database covers the years 1990-2000. The first observation for each country is the initial year of transition. However, since we lose two observations because we have limited ourselves to using internal instruments for the endogenously determined variables, the earliest possible year for the estimation is 1992. In order to make this clear, we denote our estimation sample ‘adjusted sample’. The two data sets for the EU member countries uniformly covers the period 1971-1994⁷. All data underwent extensive checks to make it comparable and compatible.

4. Econometric Issues

Two significant, general problems arise when saving determinants are investigated empirically. Since it is usually expected that savings rates change only sluggishly due to the underlying stable consumption habits, a dynamic specification is required. Furthermore, it is very likely that the majority of the explanatory variables are determined jointly with the savings rate. Therefore, an estimation procedure has to be chosen which allows and controls for the potential endogeneity of these variables.

In this study, we tackle these issues by estimating dynamic panel data models using the first-differenced GMM estimator (see Arellano/Bond 1991). This estimation procedure relies on a mild assumption concerning the initial conditions process and provides a framework that enables us to deal explicitly with the problem of potential endogeneity of explanatory variables using a set of appropriate instrument variables. Furthermore, the dynamic econometric specification allows us to distinguish between the long-run and short-run effects of the different savings determinants.

Throughout this study, we estimate dynamic fixed-effects panel data models of the form

$$(1) \quad s_{it} = \eta_i + \alpha s_{i,t-1} + \beta' x_{it} + \gamma' x_{i,t-1} + v_{it},$$

with $|\alpha| < 1$, s_{it} denoting the savings rate, η_i the time-invariant unobserved country-specific effect, x_{it} the set of potential explanatory variables, v_{it} a white-noise disturbance term, and i and t denoting country and time period, respectively. This type of model is restrictive in the sense that it allows for heterogeneity across countries only to a limited extent, since only the country-specific effects can differ, whereas the slope coefficients are assumed to be identical across countries. Other

recent estimation approaches such as the Pooled Mean Group Estimation (Pesaran/Shin/Smith 1999) allow for a higher degree of heterogeneity across countries, allowing the short-run coefficients to differ across countries, but constraining the long-run coefficients to be the same. However, since this estimation approach requires that the number of time series observations (T) be large enough such that the model can be estimated for each country separately (Pesaran/Shin/Smith 1999), it cannot be applied to our short panel.

In the following, the methodology for the first-differenced GMM estimator is outlined briefly. Recall the multivariate dynamic fixed-effects panel data model presented in equation (1)

It is assumed that the standard assumption concerning the initial conditions s_{i1} holds, such that

$$(2) \quad E(s_{i1}v_{it}) = 0 \quad \text{for } i = 1, \dots, N \text{ and } t = 2, \dots, T,$$

stating that the initial conditions are uncorrelated with subsequent disturbances (see Blundell 2002). Furthermore, the x_{it} process is correlated with the country-specific fixed effects η_i .

Since the choice of appropriate instruments for the explanatory variables depends on the correlation structure between the x_{it} process and the disturbance term v_{it} , we have to distinguish carefully between the following correlation structures:

1. If the x_{it} process is *strictly exogenous*, there is no correlation between the x_{it} process and the disturbance term v_{it} at all leads or lags.

2. If the x_{it} process is *weakly exogenous* or *predetermined*, it is correlated with past realisations of the disturbance term, but uncorrelated with contemporaneous or future realisations of the disturbance term.
3. If the x_{it} process is *endogenously* determined, it is correlated with past and contemporaneous realisations of the disturbance term, but uncorrelated with future realisations of the disturbance term.

The moment conditions for the first-differenced GMM estimator are

$$(3) \quad E(s_{i,t-s} \Delta v_{it}) = 0 \text{ for } t = 3, \dots, T \text{ and } 2 \leq s \leq t-1 \text{ and}$$

$$(4.1) \quad E(x_{ij} \Delta v_{it}) = 0 \text{ for } t = 3, \dots, T \text{ and } 1 \leq j \leq T$$

when the x_{it} process is strictly exogenously determined; or

$$(4.2) \quad E(x_{i,t-r} \Delta v_{it}) = 0 \text{ for } t = 3, \dots, T \text{ and } 1 \leq r \leq t-1$$

when the x_{it} process is predetermined; or

$$(4.3) \quad E(x_{i,t-l} \Delta v_{it}) = 0 \text{ for } t = 3, \dots, T \text{ and } 2 \leq l \leq t-1$$

when the x_{it} process is endogenously determined.

In this study, we proceed on the assumption that only demographic variables are strictly exogenous. All other explanatory variables are treated as endogenous for the time being. The validity of this assumption is checked in the course of model specification using appropriate test statistics.

Concerning the model specification and evaluation, we proceed as follows: since our panel data set for the Eastern European EU-accession countries is quite small, we have to keep an eye on the degrees of freedom when specifying the models. Therefore, we start with a parsimonious dynamic specification including the

potentially most relevant saving determinants: lagged private saving rate, income growth rate, dependency ratio, current account deficit, M2/GDP, public savings rate, and a dummy variable for the initial year of transition. The dynamic specification is required to assure that the parameters of interest can be identified and precisely estimated (see Bond 2002). Then, insignificant variables are excluded from the initial model step by step until a “core” specification is achieved. Finally, additional potentially relevant saving determinants are checked one by one to see whether they fit into the model.

The models are estimated applying the one-step⁸ first-differenced GMM estimator, which is based on a restricted instrument set in this study in order to avoid the problem of overfitting biases in small samples (Bond 2002). For each model, the validity of the instrument variables is checked using the Sargan test of over-identifying restrictions (see e.g. Arellano/Bond 1991). The model specification is confirmed if the null hypothesis, stating that the instruments are valid, cannot be rejected. Furthermore, since the consistency of the GMM estimator depends upon the assumption that the disturbance terms are not serially correlated, we always check for this, exploiting the fact that if the disturbance terms are serially correlated, we will detect second-order serial correlation in the first-differenced residuals. The lack of second-order serial correlation in the differenced residuals therefore indicates that the disturbance terms are serially uncorrelated.

However, the first-differenced GMM estimator performs poorly in terms of precision and finite sample performance if it is applied to short panels including *highly persistent* time series (see e.g. Blundell/Bond 1998). The main reason for this is that lagged levels of time series that have near unit root properties are weak instruments for subsequent first-differences. Since savings rates are usually expected to change

sluggishly due to the underlying stable consumption habits, one might expect that this would cause a problem for our preferred estimation approach. Therefore, we re-estimated the various model specifications applying the ‘system’ GMM estimator (Arellano/Bover 1995, Blundell/Bond 1998), which is a combination of the first-differenced GMM estimator and the GMM levels estimator (see Blundell 2002) and consequently exploits moment conditions on the model in levels in addition to moment conditions on the first-differenced model. However, the specification tests always indicate that the additional instruments are not valid, and that the ‘system’ GMM estimator should not be applied. This can be explained by our empirical finding that the private savings rate turned out to be far from having a unit root. In this case, the use of a ‘system’ GMM estimator requires additional moment restrictions but does not result in efficiency gains. Consequently, the first-differenced GMM estimator should be preferred. Our estimation results are presented in Table 2; final model specifications for the EU candidates and for the EU members are marked by shaded columns. The country-specific effects are significant and not reported in the table. All estimations are performed using PcGive version 10.

5. Empirical Results

Our main findings are that private savings in Eastern European EU-accession countries as well as in EU member countries are in fact driven to a very large extent by the same forces. The size of the coefficients shows a high level of similarity as well. Consequently, the short-run effects of the savings determinants are often similar. However, there are remarkable differences with regard to the long-run effects. Furthermore, the dummy variable that controls for the 'initial conditions' turns out to be insignificant. This result gives evidence that the inclusion of the initial year of transition in the sample does not cause any problems. As regards the EU, we show that the way how the private savings rate is calculated does not much influence the estimation results (Table 2, Model 9 and 10). Therefore, we conclude that the simple approach of calculating private savings, which has to be used for the EU candidate countries due to data restrictions, does not negatively effect the reliability of our estimation results. In the following we examine the results in detail.

Savings rates of the previous period have a positive and highly significant effect on today's savings rates in Eastern European EU-accession countries as well as in the EU itself. The coefficient is about 0.4 for the former and over 0.56 for the latter (Table 2) – indicating that in both cases, savings rates inherit a certain degree of persistence. With regard to the EU candidate countries, this might partly explain why savings rates did not even become negative during the very difficult early years of transition. The persistence of private savings rates is usually explained by the relative stability of consumption habits. The fact that the coefficient of the lagged private savings rate in EU-accession countries is significantly smaller than for the EU itself indicates that during the past decade, consumption patterns in the transition

economies were less stable than those in EU member countries. In general, our findings concerning the persistence of private savings are fully in line with the results reported by Loayza/Schmidt-Hebbel/Servén (1999), who analysed the determinants of private savings for a set of 150 industrialised and non-transition emerging economies. Since they also applied, among other estimation approaches, the first-differenced GMM estimator and a similar set of explanatory variables, we can compare their results to ours. Loayza et al. (1999) report a coefficient of the lagged private savings rate of about 0.48 for the emerging economies and one of 0.67 for OECD countries. Again, this finding gives evidence that the consumption patterns in long-lasting industrial countries are more stable than those in emerging economies.

According to our results, per capita income growth is positively related to private savings. This finding holds for both the EU candidates and the EU and is also reported in a variety of empirical studies (Masson/Bayoumi/Samiei 1995; Edwards 1996; Loayza/Schmidt-Hebbel/Servén 1999). Although the short-run effect of income growth is similar for both group of countries, the long-run effect is significantly smaller for the EU candidates.⁹ This might indicate that during transformation periods consumers do not primarily base their saving-consumption decisions on long-run income perspectives whereas the findings for the EU are in line with the permanent income hypothesis. This result is underpinned by our finding, that for the EU candidates the smoothed per capita income level turned out to be insignificant.

The government affects private savings not only through certain policies that enhance growth but also directly, through its own saving behaviour. We find that an increase in the savings rate of the public sector leads to a significant decline in private savings; hence providing evidence that public savings crowd out private savings. This result holds true for the EU-accession countries as well as for the EU

members. However, there are significant differences between the short-run and the long-run effects of public savings. A rise in the public savings ratio by 1% reduces the private savings rate in EU-accession countries in the short run by about the same amount, while it will lead to a decrease in private savings by only 0.5% in the long run.¹⁰ For the EU we found a similar short-run effect of public sector saving, its long-run effect, however, is significantly higher (decrease by about 0.9%). Again, this indicates that saving behaviour in the EU is to a larger extent determined by long-run perspectives than it is in the EU candidate countries.

One of the characteristics of former socialist economies was the low level of financial development at the beginning of the transformation process. This is due to the fact that banks played only a passive role in the centrally-planned socialist system. Consequently, financial sector development can be considered an indicator for the progress of transformation itself. But how is financial development related to private savings? According to our estimation, the indicator for financial depth, $M2/GDP$, has a negative sign in the case of the EU-accession countries. An increase in financial depth can be interpreted as a relaxation of the assumed credit constraint. Capital markets and banks channel funds from entities that save to those that engage in dissaving. If financial development is taking place, self-financing becomes less important, and hence private savings decrease. Therefore, the negative sign of the coefficient of the indicator for financial development is plausible and totally in line with findings of previous studies (Jappelli/Pagano 1994). For the EU member countries, $M2/GDP$ was totally insignificant indicating that a further development of the financial sector does not have any influence on private savings. This is totally in line with our expectations since the financial sector in the EU is highly developed.

It is remarkable that we could not detect any direct influence of the share of private credit to GDP on private savings in EU candidate countries. Furthermore, the influence of the real interest rate on private savings was insignificant. However, this is a result that is reported in many studies on savings (Loayza/Lopez/Schmidt-Hebbel/Servén 1998; Bailliu/Reisen 1998; Loayza/Schmidt-Hebbel/Servén 1999; Loayza/Schmidt-Hebbel/Servén 2000). More surprisingly, according to our findings, institutional development measured by the EBRD transition indicator had no influence on private savings in EU-accession countries. However, we stated that financial sector development is an important determinant for private savings and, since it can be considered an indicator for the progress of transformation itself, possible effects of the institutional development on savings might already be caught by this variable. In sum, we found only a limited direct effect of financial liberalisation on private savings. Nevertheless, these findings are widely in accordance with the findings of previous studies (Jappelli/Pagano 1994).

In this study, the inflation and unemployment rates are used to account for both general macroeconomic uncertainty and individual income uncertainty. However, despite one would expect that not the level but the volatility of both rates could have an influence on private saving behaviour, these variables were tested in our study in order to ensure the comparability with previous studies. In addition, we made calculations of alternative measures to account for the volatility of inflation. However, all of these variables that are aimed at reflecting uncertainty turned out to be insignificant.

The current account deficit was used as a proxy for foreign borrowing, since it implies that a country receives credit from other countries. Assuming that domestic savings and foreign capital might be substitutes, it is expected that a higher current account

deficit is linked to reductions in domestic savings. These expectations are supported by the estimation results. Since the time series for the current account deficit includes negative values and the estimated coefficient is positive, an increase in the current account deficit (e.g. larger negative values) decreases private savings. This finding supports the idea that the EU-accession countries have relatively good access to the international financial market and that domestic savings and foreign capital operate at least partly as substitutes. However, foreign direct investment as a percentage of gross fixed capital formation, the variable that directly reflects the ability of a country to attract foreign capital in order to finance investment, turned out to be insignificant.

For EU candidate countries, the dependency ratio displays a negative sign – a finding which is totally in line with the life-cycle hypothesis. According to this theory, individuals achieve their highest savings at the point of their highest earnings, i.e. during their working life. Correspondingly, it is assumed that individuals have negative saving rates both when they are young and also during their retirement, when their income is generally low. In other words, this means that on an aggregate level, a higher proportion of people not belonging to the work force and therefore with little or no income reduces private saving. The negative impact of the dependency ratio on private savings is a common result of many studies on savings (e.g. Callen/Thimann 1997, Loayza/Schmidt-Hebbel/Servén 1999). In contrast to our findings for the EU-accession countries, where the demographic variable was (at least weakly) significant, it was totally insignificant in our regressions for the EU member states – a finding that might be due to the existing public pension systems in Western Europe, which secure a fairly high personal income level during the retirement phase.

Finally, the dummy variable that controls for a potential shock in the initial year of transition turned out to be insignificant from the outset and was therefore excluded from the alternative specifications reported in Table 2. In order to check the stability of our estimation results with regard to 'initial conditions' we varied the sample size excluding the first transition year for each country. This sample size is too short to be a solid ground for inference. However, since the estimated coefficients (Table 2, Model 8) are very similar to those reported for the larger sample that includes the initial year of transition, it gives evidence that our estimation results are stable.

Table 2: Private savings rate: Alternative specifications

| | Results for the one-step first-differenced GMM estimator (with heteroscedasticity-consistent standard errors and test statistics) | | | | | | | | | |
|---|---|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|------------------------|
| | <i>Eastern European EU-accession countries</i> | | | | | | | <i>EU</i> | | |
| Adjusted Sample: | 1992-2000 | | | | | | | 1993-2000 | 1973-1994 | 1973-1994 ^a |
| Model: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Lagged private saving rate | 0.40*** (8.17) | 0.39*** (7.41) | 0.40*** (8.66) | 0.41*** (9.16) | 0.38*** (9.49) | 0.40*** (7.91) | 0.40*** (9.36) | 0.37*** (4.14) | 0.56*** (11.4) | 0.63*** (15.1) |
| Public saving rate | -0.97*** (-6.14) | -0.96*** (-9.66) | -0.99*** (-6.81) | -1.01*** (-7.78) | -0.95*** (-6.53) | -0.97*** (-7.07) | -0.99*** (-7.72) | -0.96*** (-8.97) | -0.93*** (-26.3) | -0.83*** (-14.6) |
| Lagged public saving rate | 0.67*** (6.45) | 0.60*** (5.04) | 0.65*** (5.40) | 0.65*** (6.98) | 0.63*** (6.13) | 0.66*** (5.47) | 0.66*** (6.15) | 0.74*** (6.34) | 0.55*** (9.3) | 0.55*** (9.7) |
| Dependency ratio | -0.98 (-1.39) | -1.25* (-1.99) | -1.07 (-1.67) | -1.04* (-1.74) | -1.02 (-1.50) | -0.86 (-1.34) | -0.83 (-1.18) | -1.62** (-2.58) | | |
| Current account deficit | 0.47*** (9.30) | 0.45*** (15.8) | 0.46*** (9.93) | 0.47*** (10.4) | 0.45*** (10.5) | 0.46*** (8.31) | 0.46*** (10.2) | 0.44*** (9.34) | 0.25*** (6.2) | 0.34*** (7.9) |
| Lagged current account deficit | -0.16* (-1.90) | -0.14* (-1.89) | -0.16** (-2.19) | -0.14** (-2.06) | -0.14** (-1.98) | -0.15* (-1.82) | -0.16** (-2.16) | -0.02 (-0.34) | -0.18*** (-3.8) | -0.15** (-2.7) |
| Growth rate of real per-capita GDP | 0.35*** (6.22) | 0.36*** (8.32) | 0.36*** (8.78) | 0.35*** (8.65) | 0.32*** (5.79) | 0.32*** (4.94) | 0.34*** (7.46) | 0.33*** (13.3) | 0.33*** (8.6) | 0.33*** (10.8) |
| Lagged growth rate of real per-capita GDP | | | | | | | | | 0.08** (2.8) | 0.08** (2.1) |
| M2/GDP | -0.22** (-2.27) | -0.23*** (-3.05) | -0.23*** (-3.49) | -0.23*** (-3.04) | -0.24*** (-3.21) | -0.22*** (-3.07) | -0.19 (-1.48) | -0.27*** (-5.59) | | |
| Lagged M2/GDP | 0.23*** (3.15) | 0.22** (2.45) | 0.25** (2.60) | 0.25*** (3.8) | 0.24*** (3.03) | 0.24** (2.48) | 0.22** (2.63) | 0.37*** (8.06) | | |
| Credit to private sector | | 0.07 (1.47) | | | | | | | | |
| Real interest rate | | | -0.01 (-0.81) | | | | | | | |
| Unemployment | | | | 0.01 (0.07) | | | | | | |
| FDI/GFCF | | | | | -0.04 (-1.38) | | | | | |
| EBRD Transition indicator | | | | | | 0.01 (0.66) | | | | |
| Inflation | | | | | | | 0.002 (0.56) | | | |
| Obs | 77 | 74 | 75 | 77 | 76 | 77 | 77 | 70 | 266 | 265 |

Table 2: Private savings rate: Alternative specifications (continued)

| | Results for the one-step first-differenced GMM estimator (with heteroscedasticity-consistent standard errors and test statistics) | | | | | | | | | |
|-------------------------|---|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---|--------------------|------------------------|
| | <i>Eastern European EU-accession countries</i> | | | | | | | <i>EU</i> | | |
| Adjusted Sample: | 1992-2000 | | | | | | | 1993-2000 | 1973-1994 | 1973-1994 ^a |
| Model: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Sargan Test | 49.14 [0.31] | 51.81 [0.52] | 50.16 [0.59] | 54.87 [0.40] | 52.57 [0.49] | 52.72 [0.49] | 56.80 [0.34] | 48.14 [0.96] | 290.4 [0.05] | 268.9 [0.24] |
| AR (1) Test | -2.62** [0.009] | -2.64** [0.008] | -2.66** [0.008] | -2.60** [0.009] | -2.62** [0.009] | -2.60** [0.009] | -2.70** [0.007] | -2.27* [0.02] | -3.07** [0.002] | -3.13** [0.002] |
| AR (2) Test | -1.52 [0.13] | -0.35 [0.73] | -1.59 [0.11] | -1.48 [0.14] | -1.80 [0.07] | -1.90 [0.06] | -1.82 [0.07] | 0.46 [0.65] | -0.85 [0.4] | -0.27 [0.8] |
| Model settings | | | | | | | | | | |
| Transformation used | first differences | | | | | | | | | |
| Transformed instruments | DepRatio | | | | | | | -- | | |
| Level instruments | Dummies, Gmm(PRIVSAV,2,3), Gmm(PUBSAV,2,2), Gmm(Caccount,2,2), Gmm(pc_inc_growth,2,2), Gmm(M2_GDP,2,2) | | | | | | | Dummies, Gmm(PRIVSAV,2,4), Gmm(PUBSAV,2,4), Gmm(Caccount,2,4), Gmm(pc_inc_growth,2,4) | | |

t-values in brackets

*, ** and ***: significant at the 10%, 5% and 1% level

^a Figures for private savings are taken from the World Bank's "World saving database".

6. Conclusions

After the dramatic drop in domestic savings that took place in the early years of transition, savings rates in the majority of Eastern European EU-accession countries soon recovered and have remained relatively stable during recent years. This development may indicate that a process of radical change has come to an end: a period that commenced with high involuntary saving has ended with market-driven saving. Does this imply that a convergence in motives for savings has also been achieved? Are the driving forces behind private savings in the Eastern European EU-accession countries now similar to those in the EU itself?

Our findings support the major hypothesis of this study that private savings in EU candidate countries as well as in the EU are to a large extent driven by the same key factors: Saving behaviour shows a certain degree of persistence, positive changes in per capita income growth positively influence saving, the dependency ratio is negatively related to saving, and a better performance of the domestic financial market as well as relaxing the international borrowing constraint decrease savings. Finally, public savings crowds out private savings. In addition to our finding that a convergence in the motives for private savings has taken place, we have also noted that the short-run effects of the determinants on private savings in EU candidate and EU member countries are remarkably similar in terms of size and significance. However, the long-run effects of income growth and public sector savings on private savings are significantly larger in the EU than in the EU-accession countries, indicating that saving behavior in EU member countries is to a larger extent determined by long-run perspectives than it is in the candidate countries. Contrary to our expectations, the EBRD transition indicator used to measure the quality of the external institutional framework turned out to be insignificant. However, it is possible

that progress made in the development of the domestic financial market – which can be interpreted as an indicator for the progress of transformation itself -- already accounts for this effect. We consider our results reliable because we have undertaken substantial efforts to achieve consistency of the database, and appropriateness of the estimation procedure and model specifications. Furthermore, variations in sample size indicate that the estimation results are stable. Finally, we provide evidence that the rather simple approach for the calculation of private savings, which has to be used for the EU candidate countries due to data restrictions, does not negatively effect the reliability of our estimation results.

While the motives for savings seem to be quite similar within our group of countries, the resulting saving rates are still different. This is due to various factors, such as differences in the growth rate etc. If we assume that saving does play an important role for investment, then we are faced with the question of how to promote saving in the countries under consideration. Regarding the estimation results, spurring economic development in order to increase per capita income and improving the performance of domestic financial markets are suitable ways to increase saving in the EU-accession countries. In general, however, our findings show that policies that aim to increase saving can be much the same for both EU candidate and member countries, although saving behaviour in the EU is to a larger extent determined by long-run perspectives than it is in the EU candidate countries.

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Appendix

Table 1: List of data sources

| Data | Source |
|--|---|
| Demographic Structure | |
| Dependency ratios | World Bank, World Development Indicators |
| Youth dependency ratio | World Bank, World Development Indicators, own calculations |
| Old-age-dependency ratio | World Bank, World Development Indicators, own calculations |
| Economic Development | |
| GDP per capita | World Bank, World Development Indicators, own calculations |
| GDP growth | World Bank, World Development Indicators, National Statistics |
| Domestic saving | World Bank, World Development Indicators |
| Unemployment | National Statistics |
| Current account balance | World Bank, World Development Indicators, International Monetary Fund, International Financial Statistics |
| Monetary and Financial Market Indicators | |
| CPI | National Statistics |
| Private or domestic credit | International Monetary Fund, International Financial Statistics |
| Interest rates | International Monetary Fund, International Financial Statistics |
| Real interest rate | Own calculations |
| M2/GDP | International Monetary Fund, International Financial Statistics, own calculations |
| Government | |
| Overall budget balance | World Bank, World Development Indicators |
| Transition indicator | European Bank for Reconstruction and Development |
| Private savings rates for EU countries (see Chapter 3) | World Bank, World saving database |

¹ Commonwealth of Independent States (CIS) comprises the states of the former Soviet Union excluding the Baltic countries.

² For the countries under consideration the transformation process started at different points in time. 1990: Czech Republic, Hungary, Poland, Slovenia, Slovak Republic; 1991: Romania and Bulgaria; 1992: Baltic countries. This is taken into account in Figure 2a-2c.

³ The overall budget balance is current and capital revenue plus official grants received, minus total expenditure and minus net lending (lending minus repayments). We would have liked to subtract capital transfers from abroad from the overall budget balance, but the respective figures are not available for the countries under consideration.

⁴ We would have liked to calculate the saving ratio using disposable income as a base, but these figures are unavailable for the EU candidate countries.

$$^5 r_t = \ln(1 + i_t) - \ln\left(1 + \frac{\pi_{t-1} + \pi_t + \pi_{t+1}}{3}\right)$$

⁶ The progress is measured against the standards of industrialised market economies. The measurement scale for the single indicators ranges from 1 to 4.25, where 1 represents little or no change from a rigidly planned economy and 4.25 represents the standard of an industrialized market economy.

⁷ Since the World Bank data for EU member countries end in 1994, we have to adjust the second sample accordingly to assure that estimation results are comparable.

⁸ The one-step estimator is recommended for small samples (see Bond 2002).

⁹ The long-run effect is 0.6 for the EU candidates and 0.9 for the EU.

¹⁰ The long-run effect of public savings in model 1 is calculated as follows:

$(-0.97 + 0.67)/(1 - 0.4) = -0.5$, where the nominator is the sum of the coefficients of the public saving rate in t and $t-1$ and the denominator is 1 minus the coefficient of the lagged private savings rate.